Figure 1

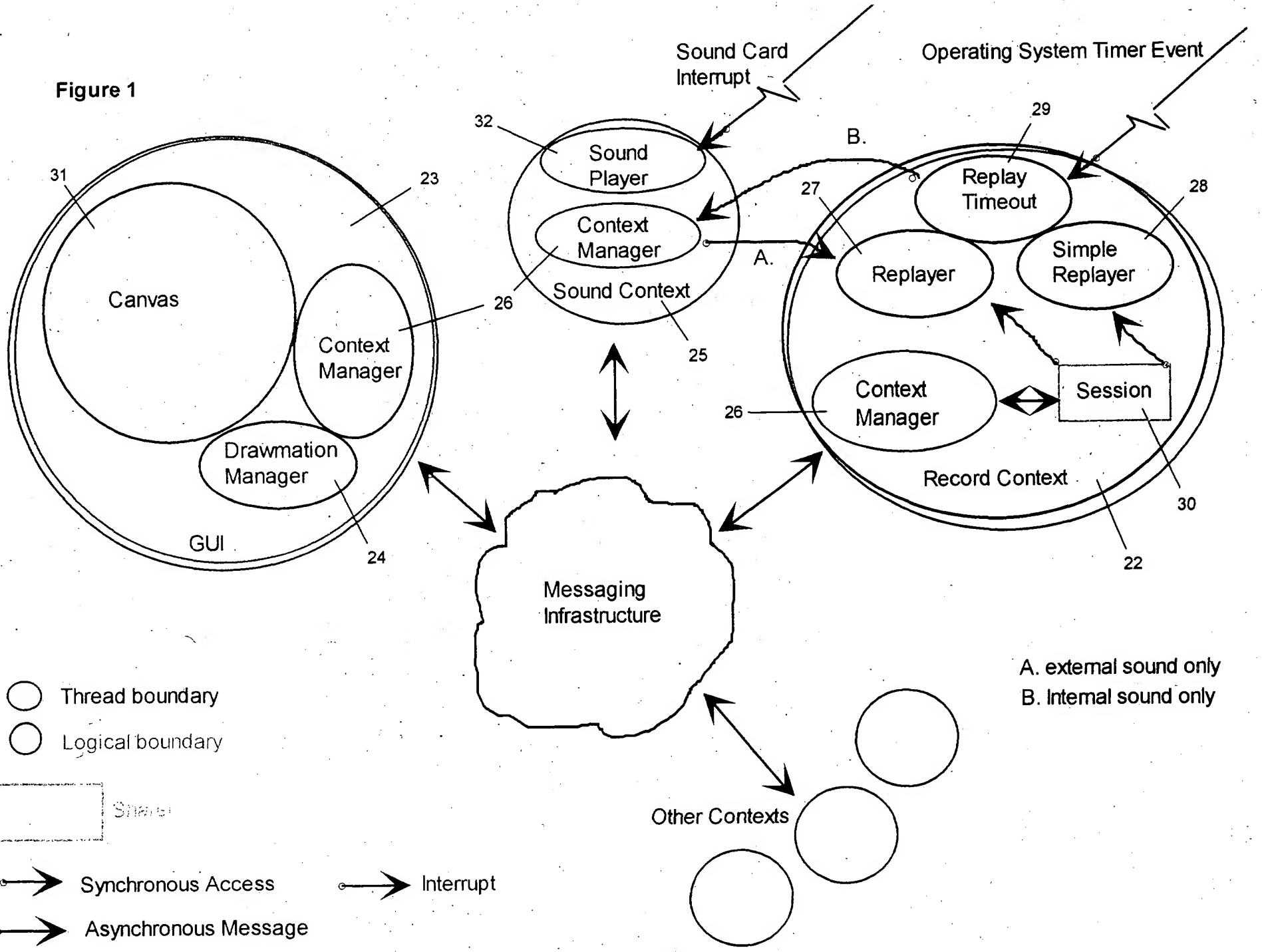

Sound Card Interrupt
Operating System Timer Event
32
Sound Player
Context Manager
Sound Context
25
26
31
23
Canvas
Context Manager
Drawmation Manager
24
GUI
B.
29
Replay Timeout
27
28
A.
Replayer
Simple Replayer
Context Manager
26
Session
30
Record Context
22
Messaging Infrastructure
Other Contexts
Thread boundary
Logical boundary
Synchronous Access
Interrupt
Asynchronous Message
A. external sound only
B. Internal sound only

Figure 2

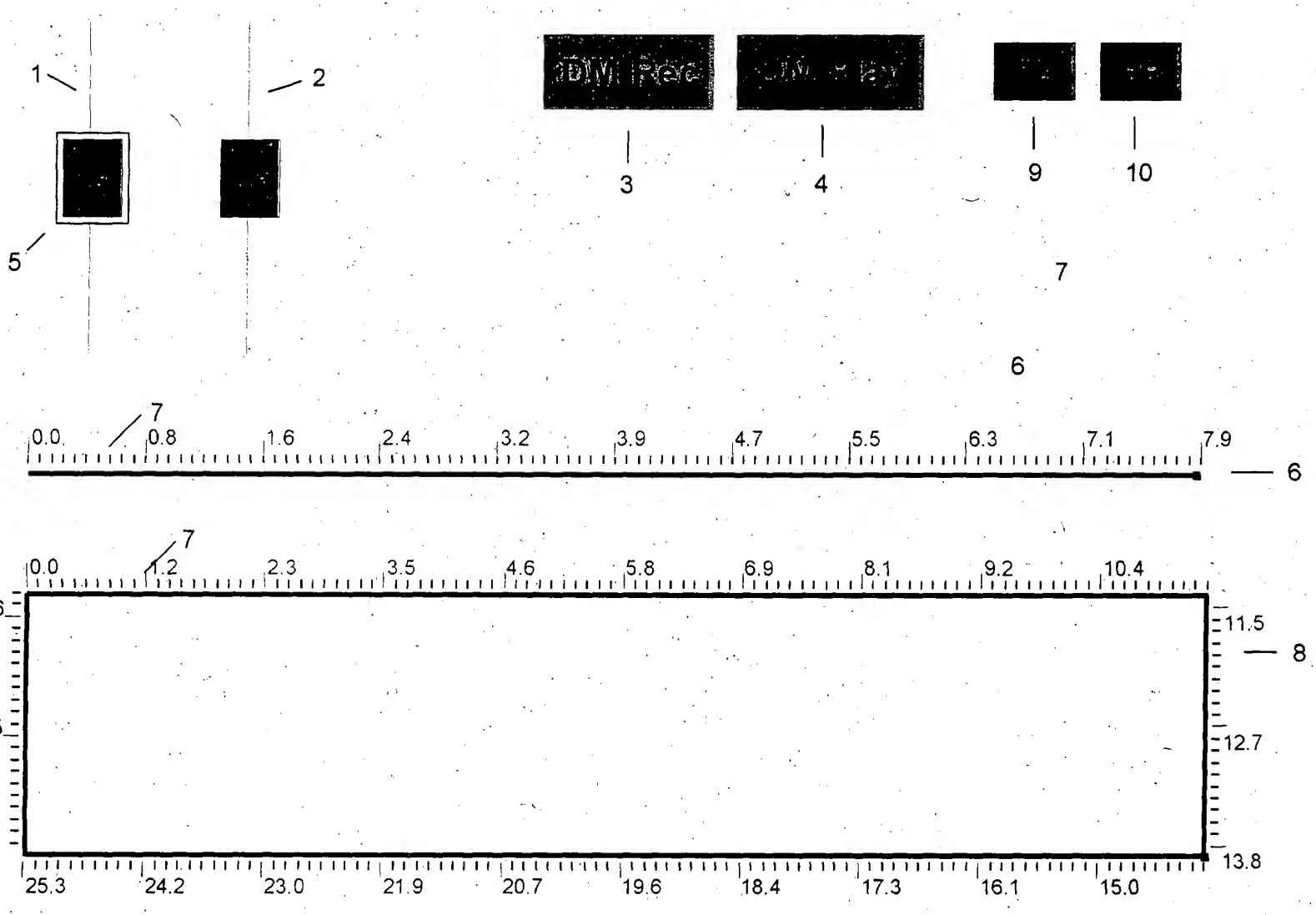

1
2
3
4
5
6
7
8
9
10
0.0
0.8
1.6
2.4
3.2
3.9
4.7
5.5
6.3
7.1
7.9
0.0
1.2
2.3
3.5
4.6
5.8
6.9
8.1
9.2
10.4
27.6
26.5
11.5
12.7
13.8
25.3
24.2
23.0
21.9
20.7
19.6
18.4
17.3
16.1
15.0

Figure 3

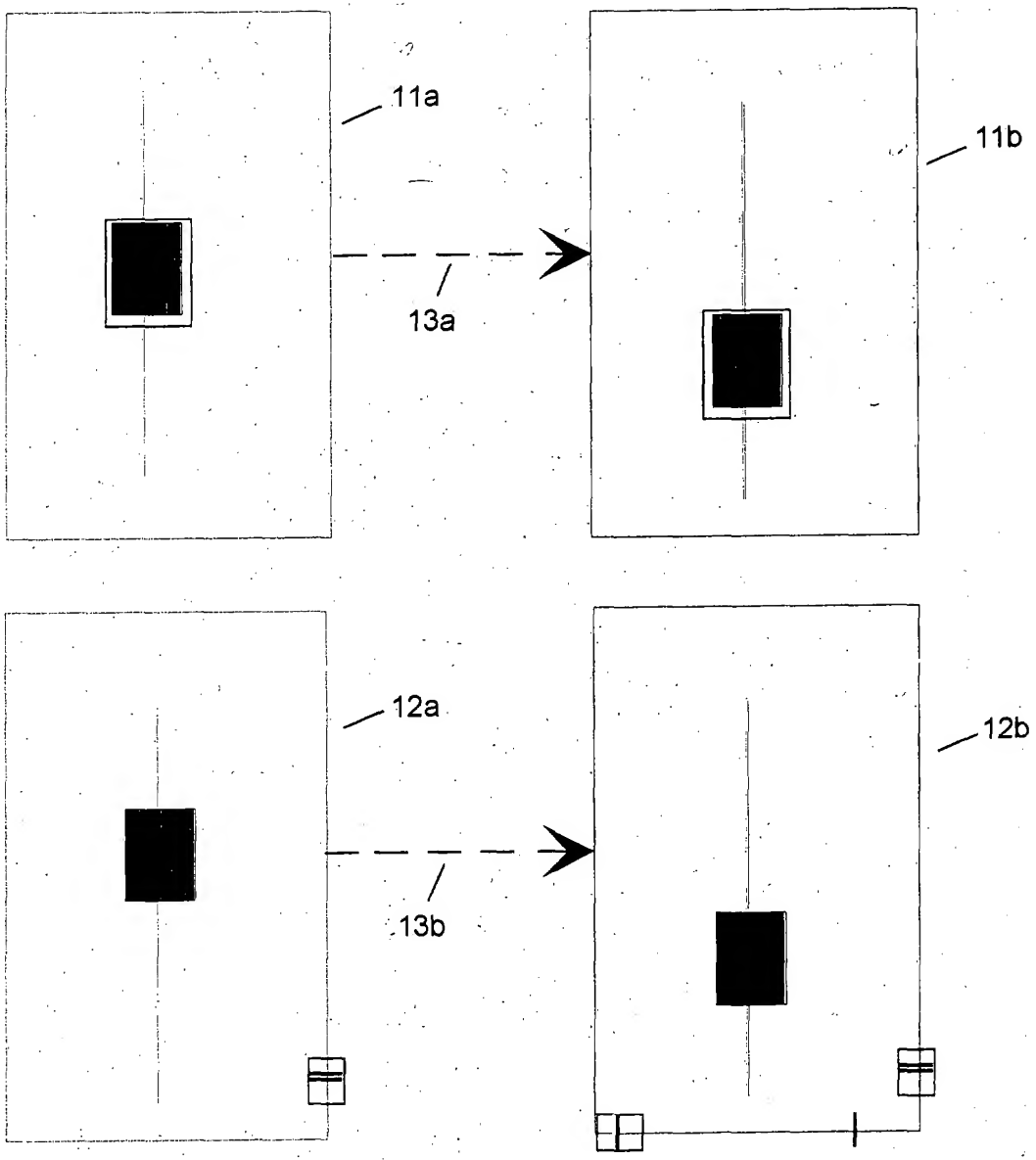


Figure 4

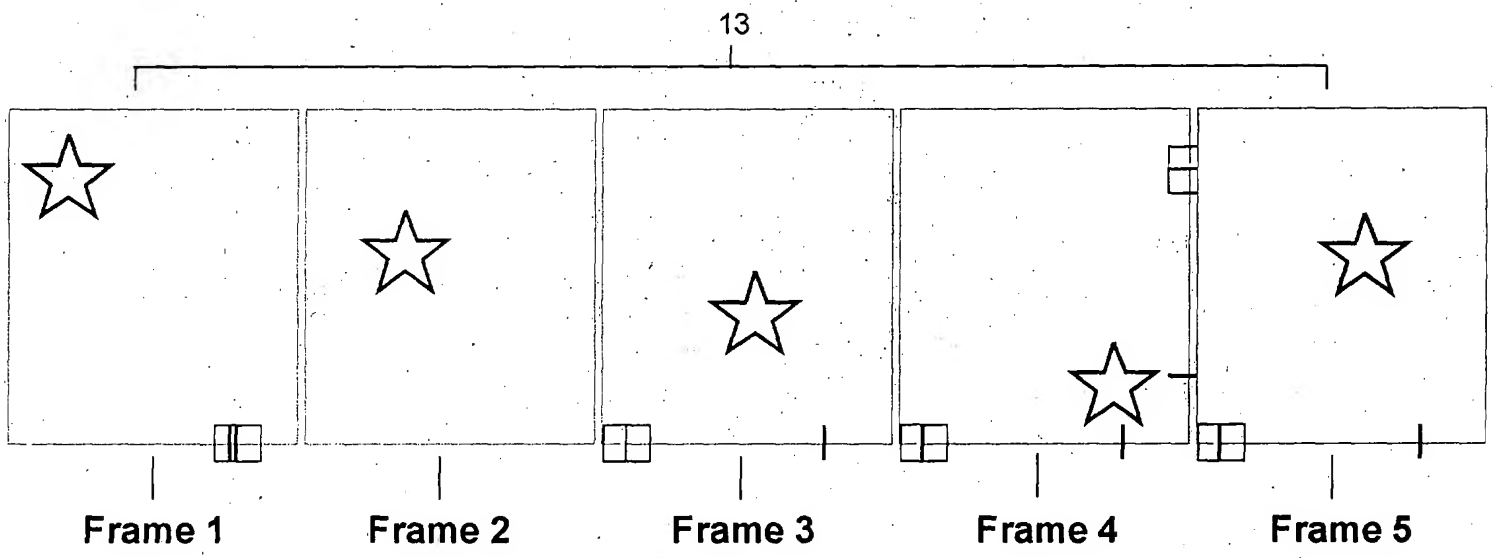


Figure 5

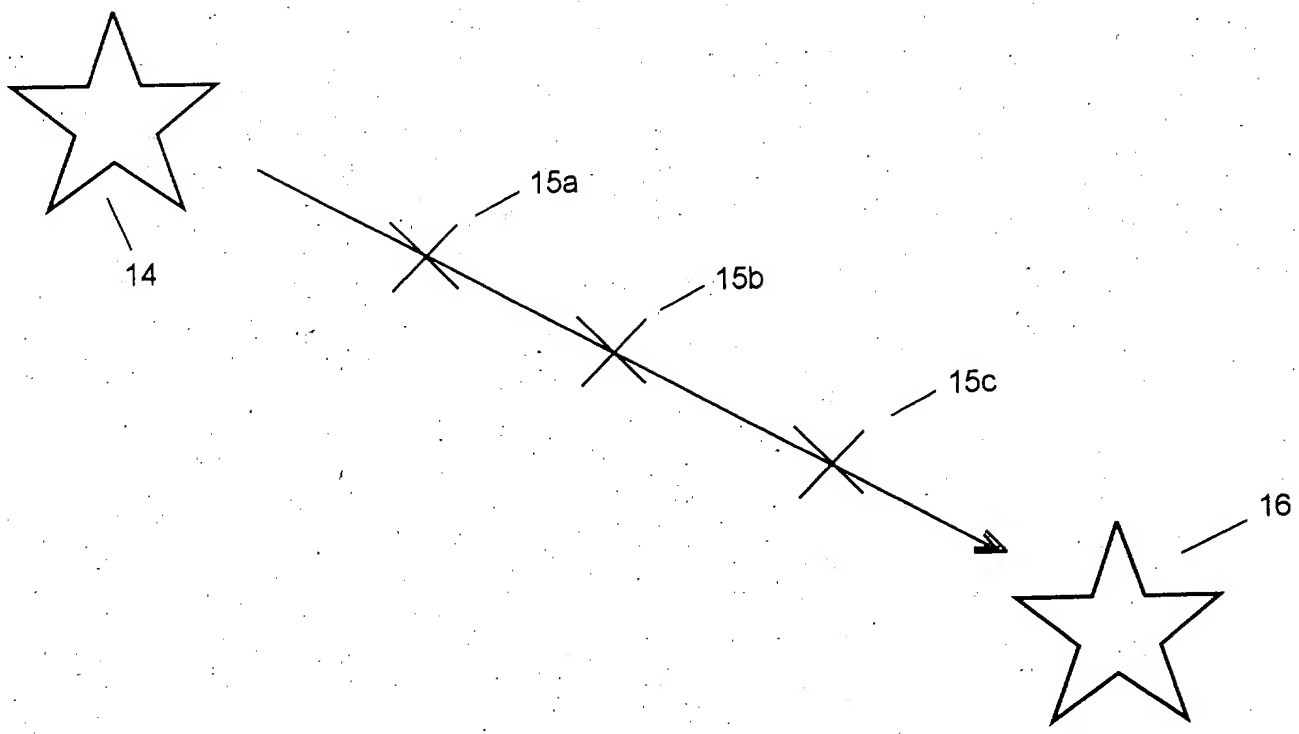


Figure 6

Record Pass

Current Session

Multiple record passes can be made during a single replay cycle.

During the first replay cycle in which a control is recorded, it is automatically punched in and out when recording starts and stops.

Note that replay does not have to start at the beginning of the session. Replay may be started at any point up to the end of the session.

Note that the duration of the current session is extended by recording past the replay end time. On the next replay cycle, replay will end at this new time (if the user does not record past it again).

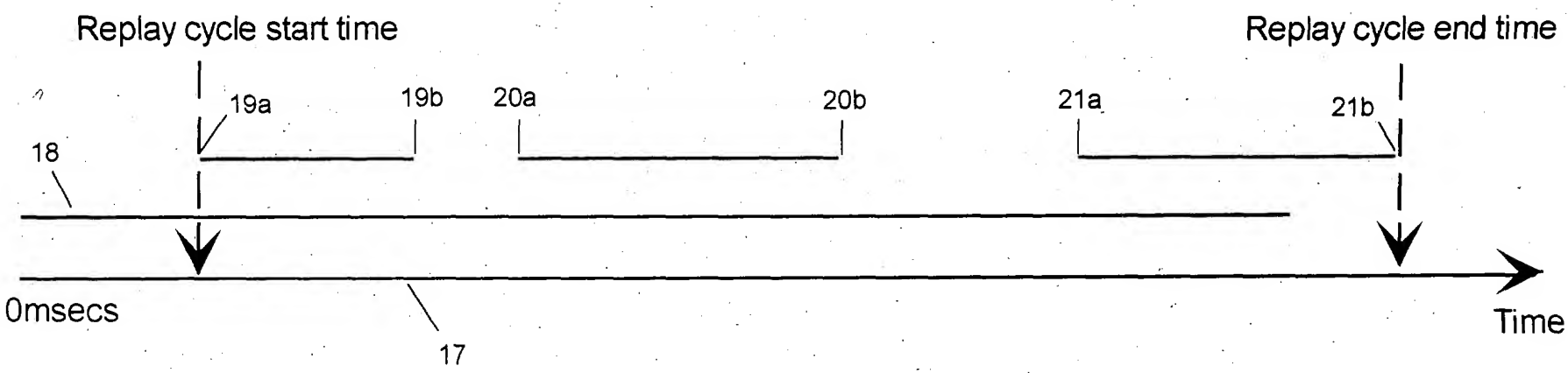


Figure 7

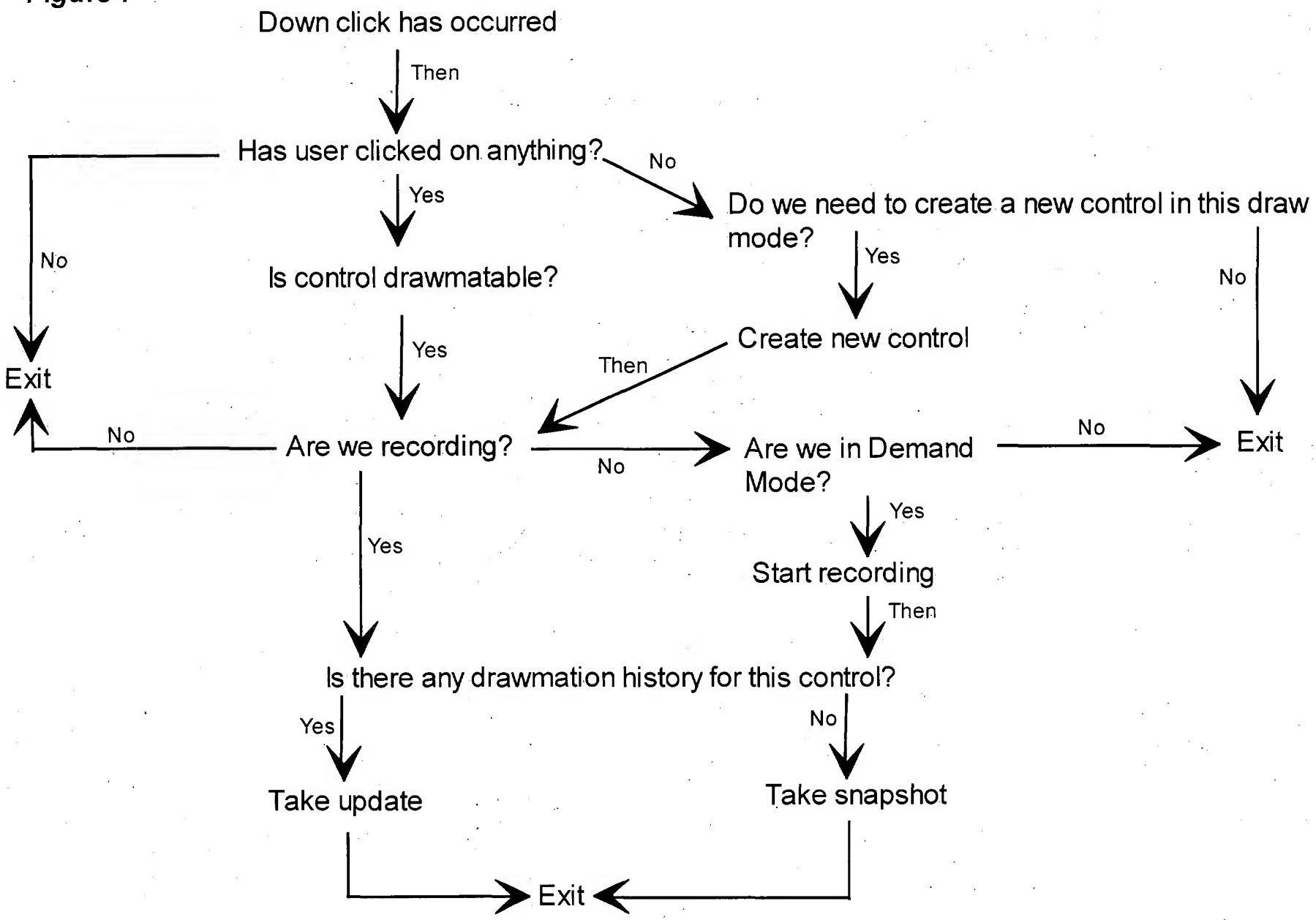

Down click has occurred
Then
Has user clicked on anything?
No
Yes
Do we need to create a new control in this draw mode?
Yes
No
No
Is control drawmatable?
Create new control
Yes
Then
Exit
Then
No
Are we recording?
No
Are we in Demand Mode?
No
Exit
Yes
Yes
Start recording
Then
Is there any drawmation history for this control?
Yes
No
Take update
Take snapshot
Exit

Figure 8

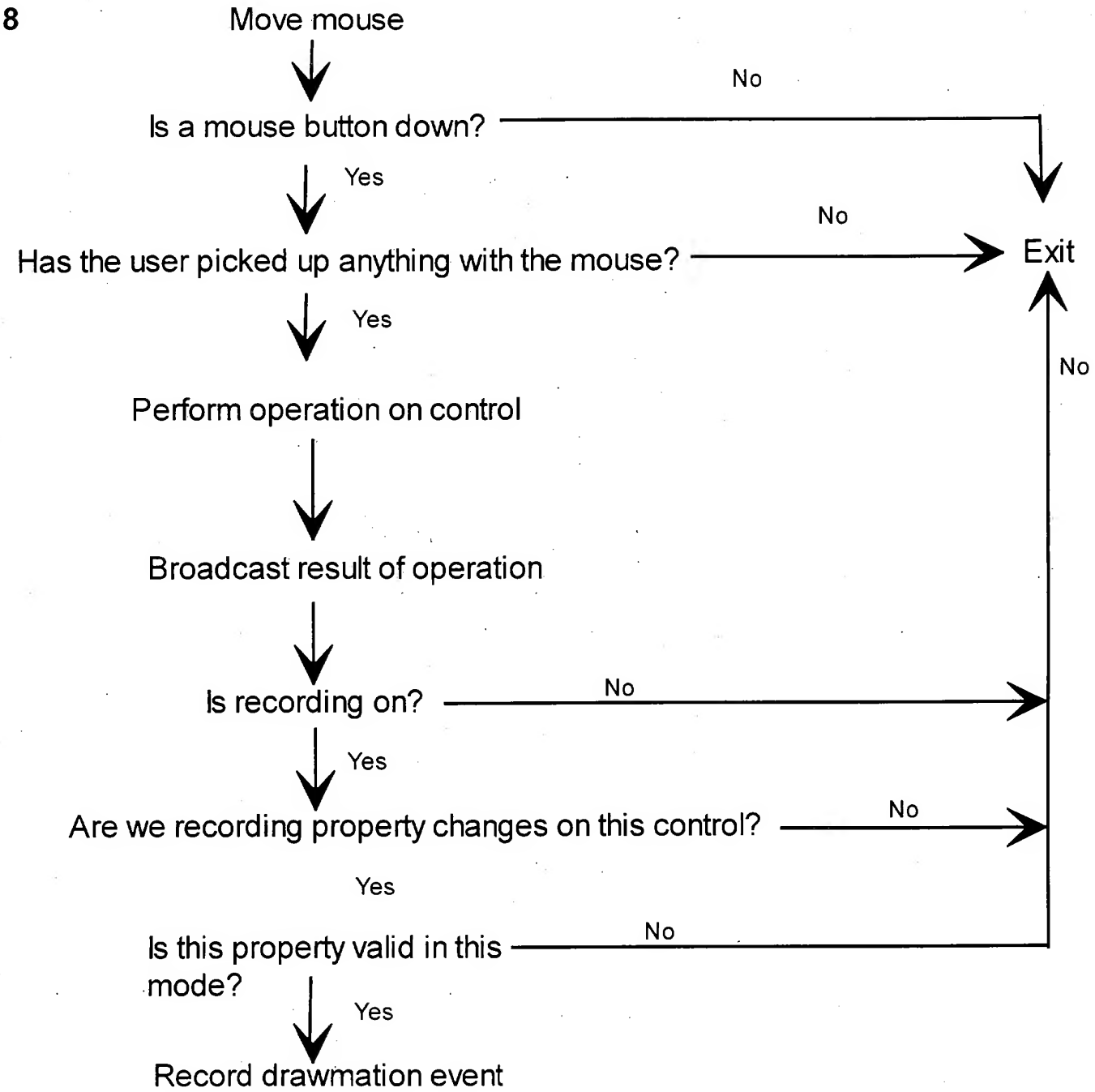

Move mouse
Is a mouse button down?
No
Yes
Has the user picked up anything with the mouse?
No
Exit
Yes
Perform operation on control
No
Broadcast result of operation
Is recording on?
No
Yes
Are we recording property changes on this control?
No
Yes
Is this property valid in this mode?
No
Yes
Record drawmation event

Figure 9

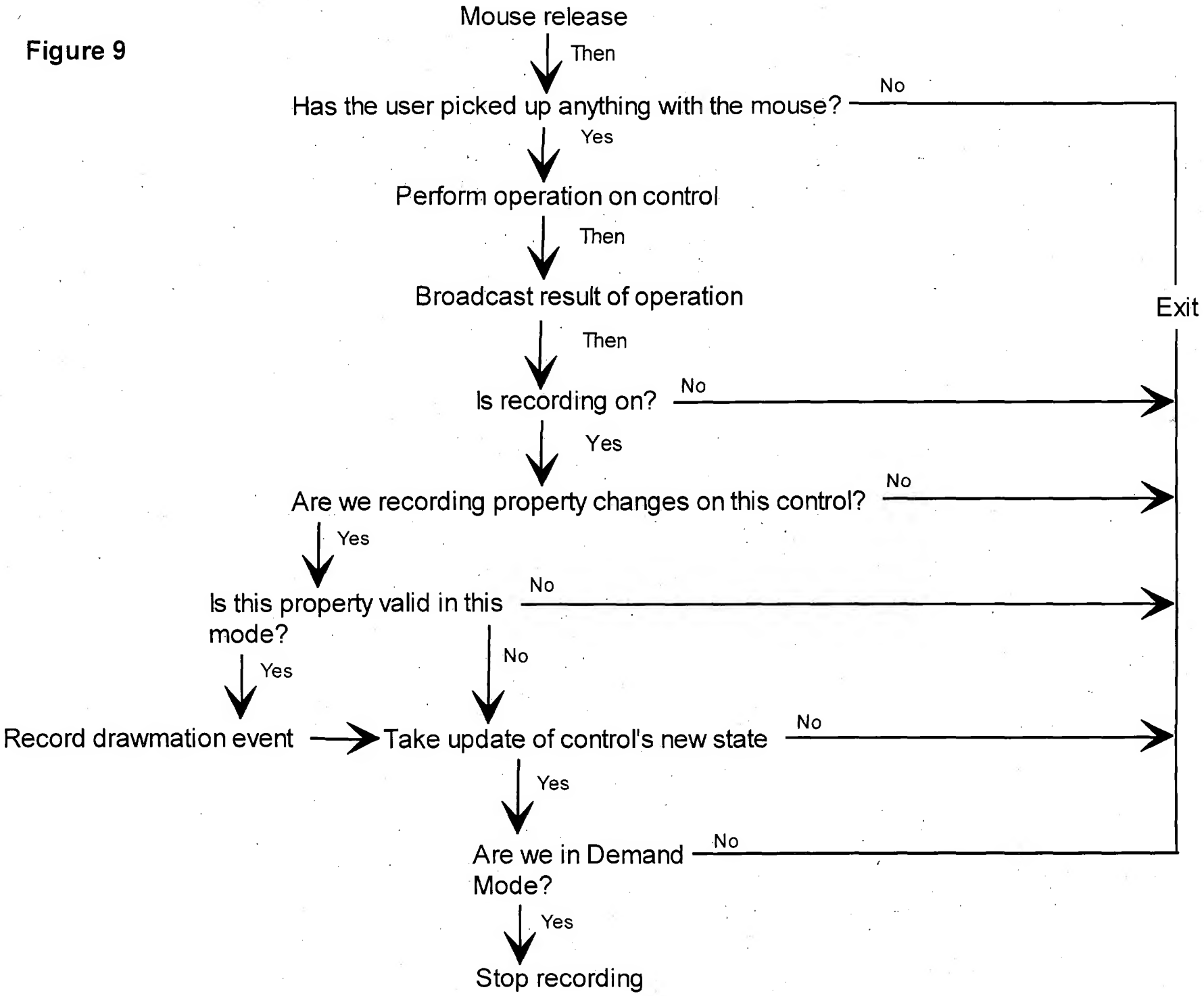
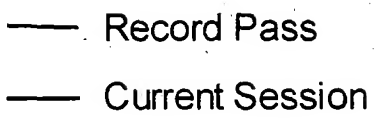

Mouse release
Then
Has the user picked up anything with the mouse?
No
Yes
Perform operation on control
Then
Broadcast result of operation
Then
Exit
Is recording on?
No
Yes
Are we recording property changes on this control?
No
Yes
Is this property valid in this mode?
No
Yes
No
Record drawmation event
Take update of control's new state
No
Yes
Are we in Demand Mode?
No
Yes
Stop recording

Figure 10

Multiple record passes can be made during a single replay cycle.

During the first replay cycle in which a control is recorded, it is automatically punched in and out when recording starts and stops.



Note that replay does not have to start at the beginning of the session. Replay may be started at any point up to the end of the session.

Note that the duration of the current session is extended by recording past the replay end time. On the next replay cycle, replay will end at this new time (if the user does not record past it again).

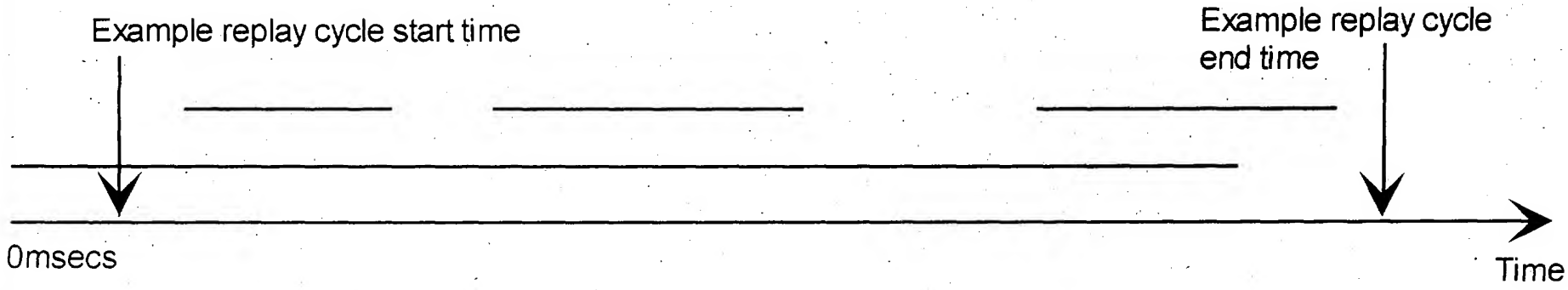


Figure 11

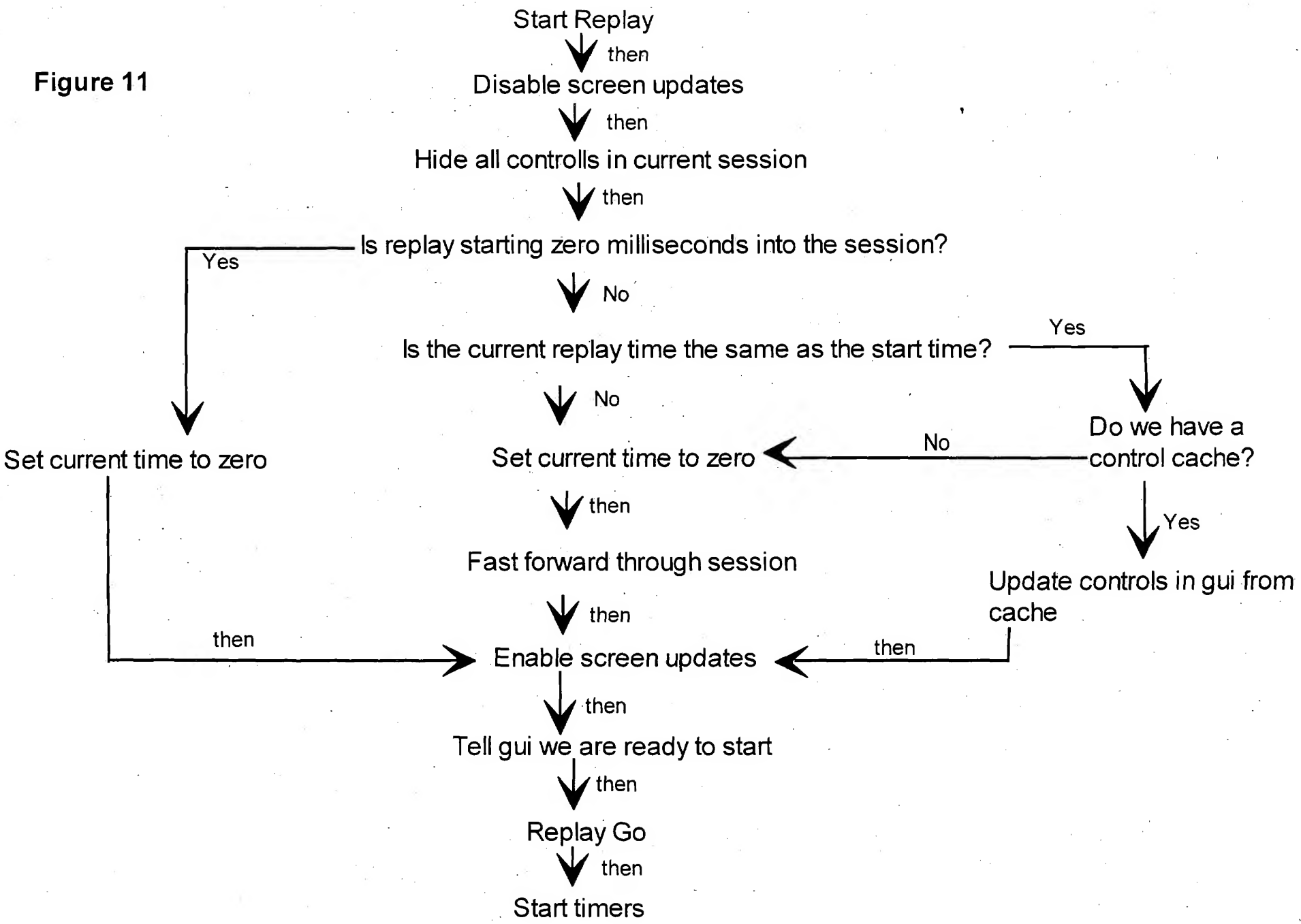

Start Replay
then
Disable screen updates
then
Hide all controlls in current session
then
Is replay starting zero milliseconds into the session?
Yes
No
Is the current replay time the same as the start time?
Yes
No
Do we have a control cache?
No
Set current time to zero
Set current time to zero
then
Fast forward through session
Yes
Update controls in gui from cache
then
then
then
Enable screen updates
then
Tell gui we are ready to start
then
Replay Go
then
Start timers

Figure 12

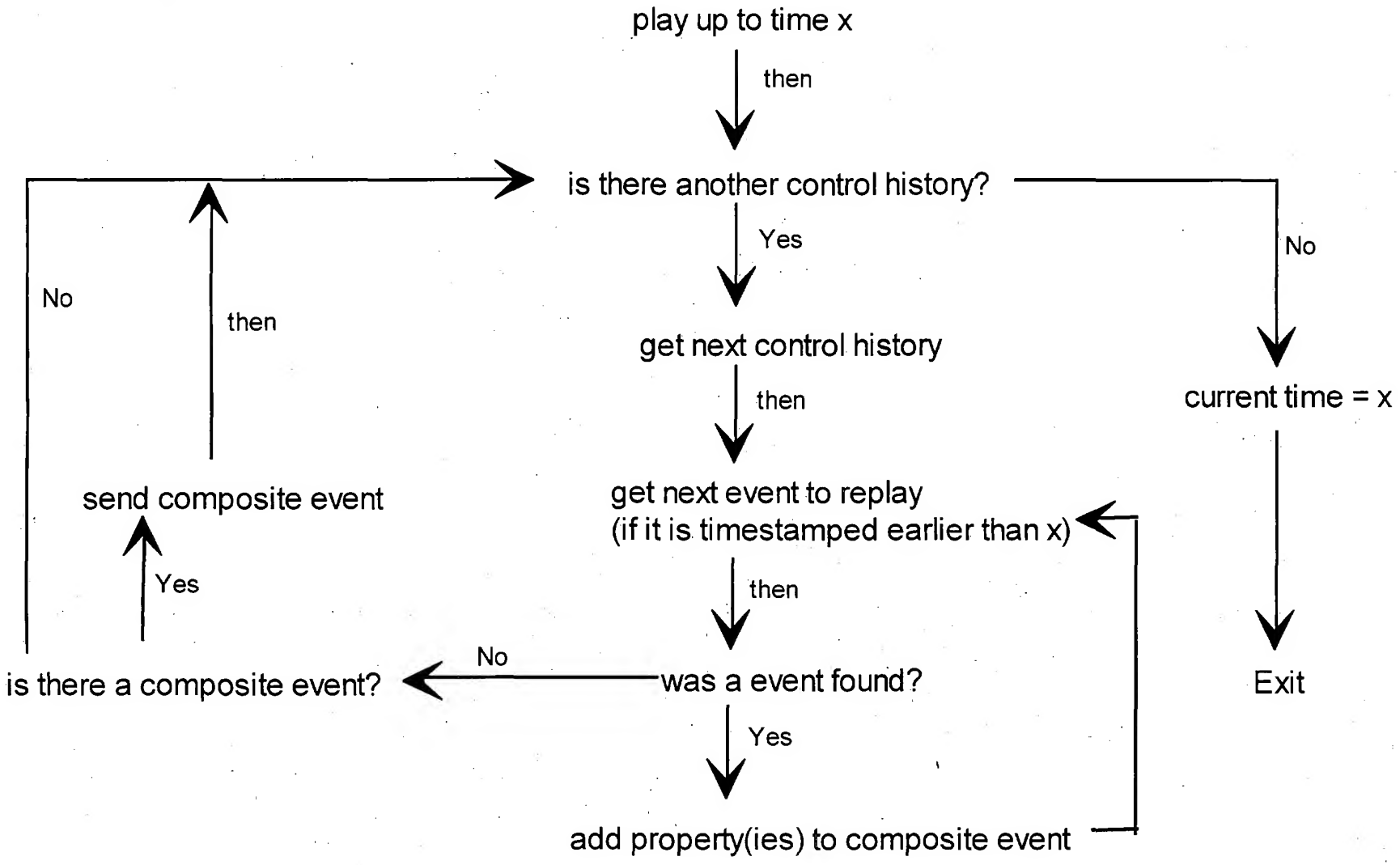

play up to time x
then
is there another control history?
Yes
No
get next control history
then
current time = x
get next event to replay
(if it is timestamped earlier than x)
then
was a event found?
No
Yes
add property(ies) to composite event
is there a composite event?
No
Yes
send composite event
then
Exit

Figure 13

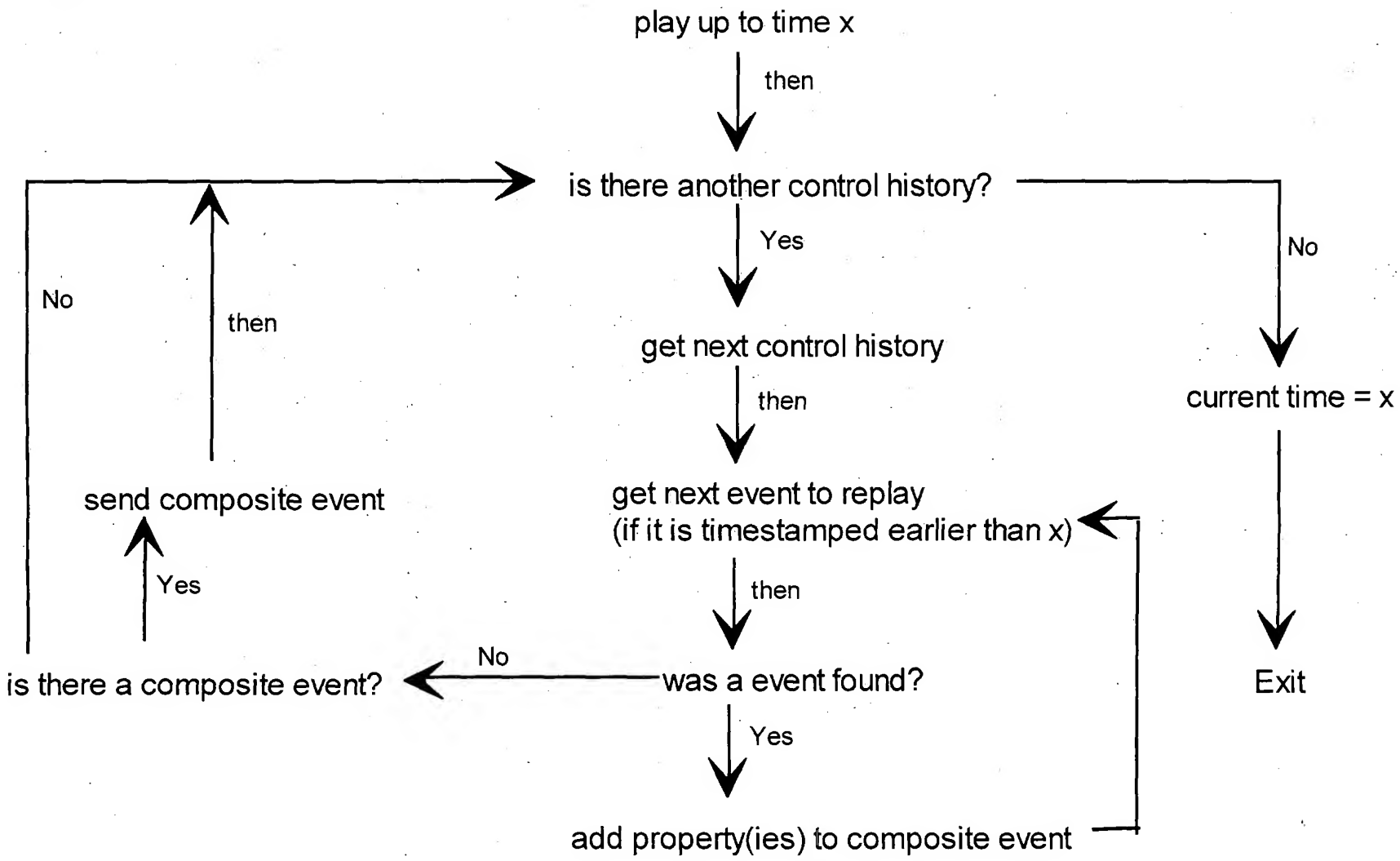

play up to time x
then
is there another control history?
Yes
No
get next control history
then
current time = x
get next event to replay
(if it is timestamped earlier than x)
then
was a event found?
No
Yes
add property(ies) to composite event
Exit
is there a composite event?
No
Yes
send composite event
then

Figure 14

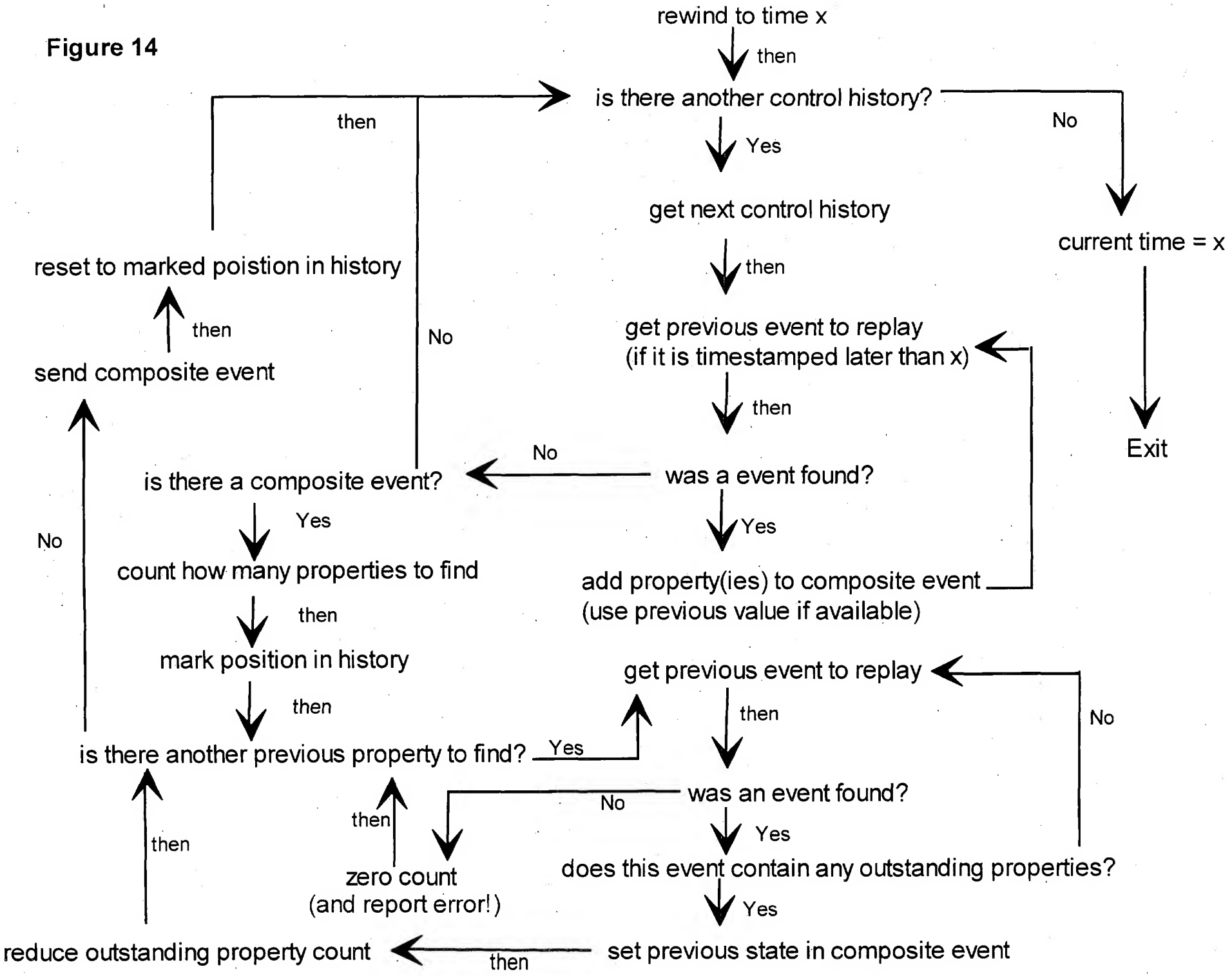

rewind to time x
then
is there another control history?
No
Yes
get next control history
current time = x
then
reset to marked poistion in history
then
send composite event
No
get previous event to replay
(if it is timestamped later than x)
then
Exit
No
is there a composite event?
was a event found?
Yes
Yes
No
count how many properties to find
add property(ies) to composite event
(use previous value if available)
then
mark position in history
then
get previous event to replay
then
No
is there another previous property to find?
Yes
was an event found?
No
then
then
Yes
zero count
(and report error!)
does this event contain any outstanding properties?
Yes
reduce outstanding property count
then
set previous state in composite event

Figure 15

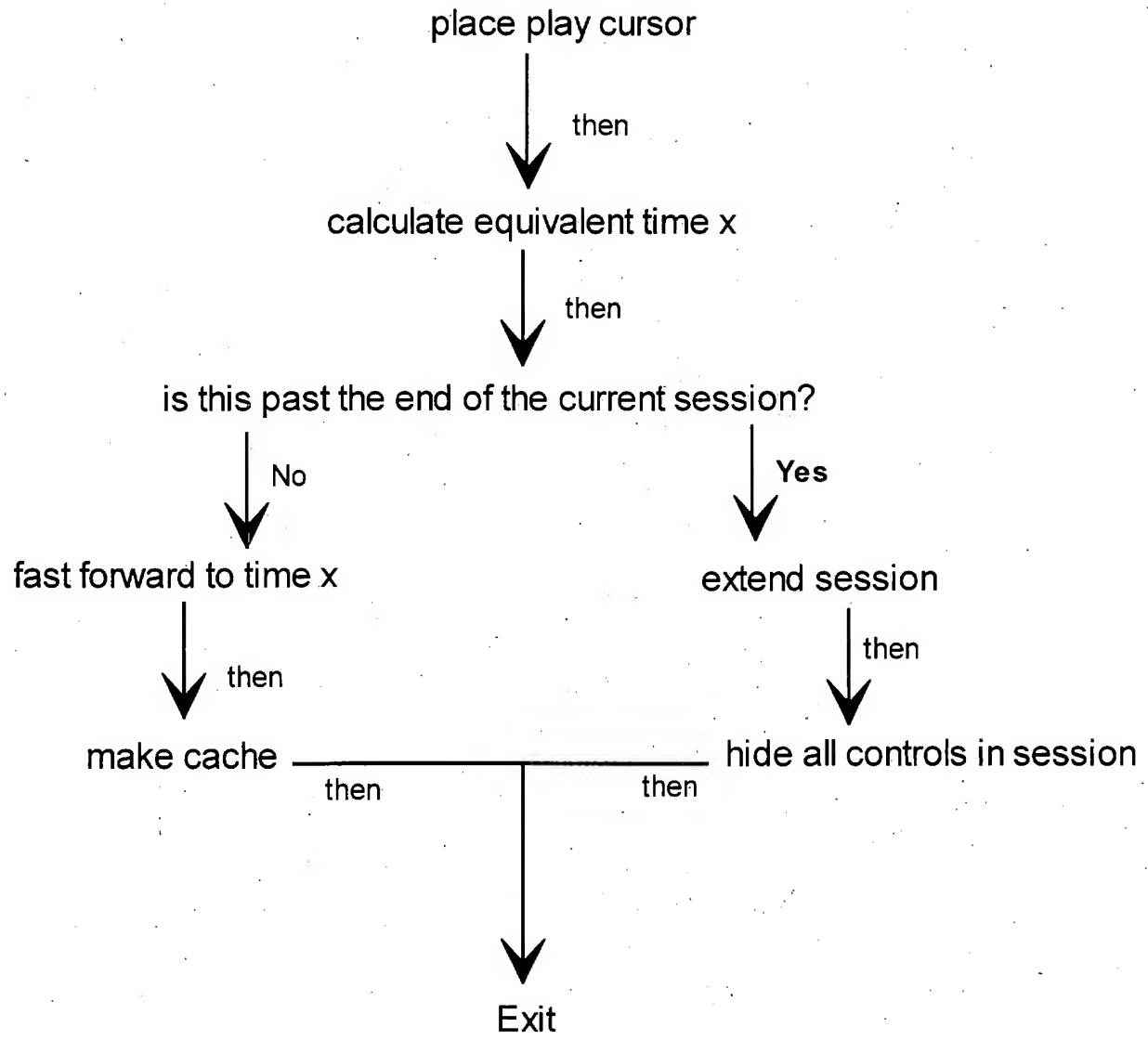

place play cursor
then
calculate equivalent time x
then
is this past the end of the current session?
No
Yes
fast forward to time x
extend session
then
then
make cache
hide all controls in session
then
then
Exit

Figure 16

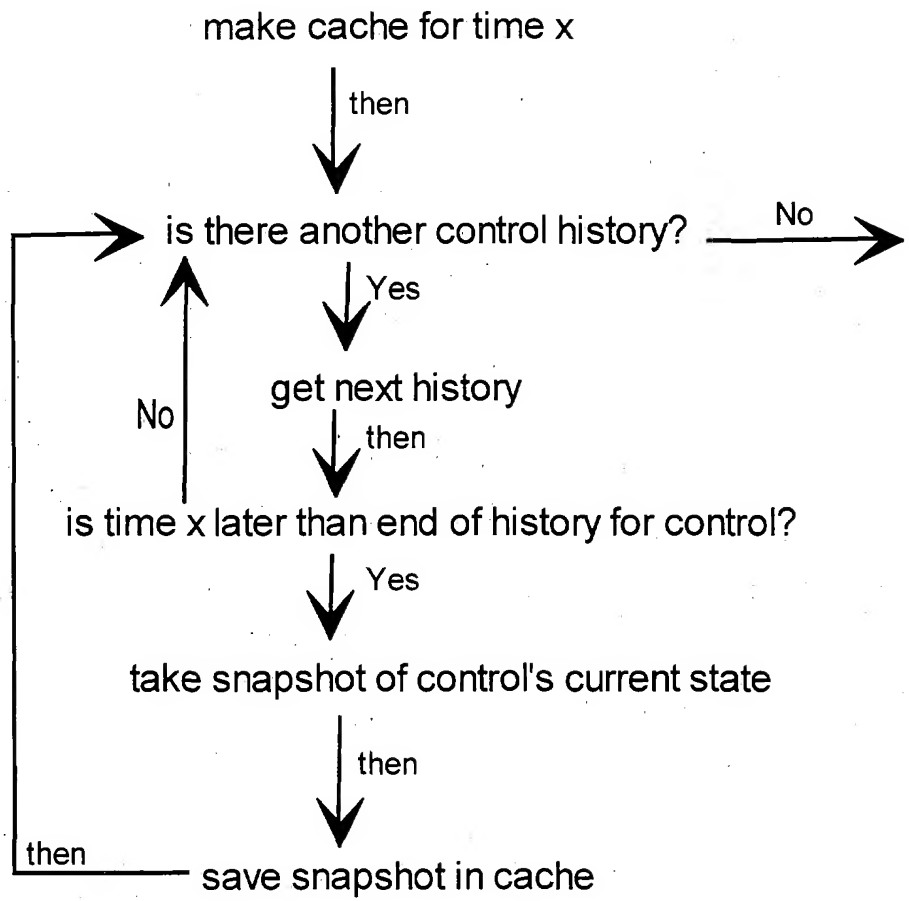
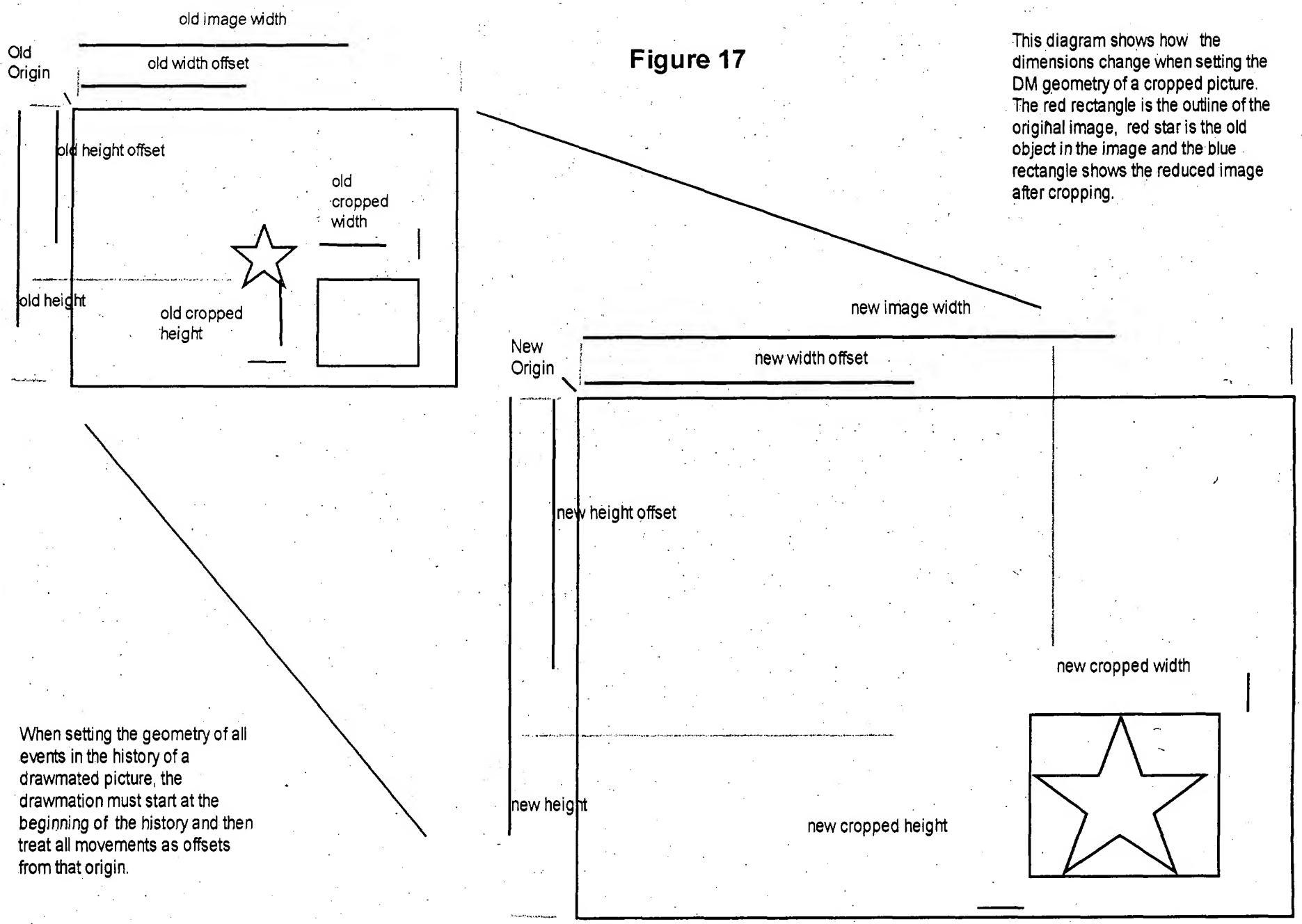

make cache for time x
then
is there another control history?
No
Yes
get next history
No
then
is time x later than end of history for control?
Yes
take snapshot of control's current state
then
then
save snapshot in cache

Figure 17



This diagram shows how the dimensions change when setting the DM geometry of a cropped picture. The red rectangle is the outline of the original image, red star is the old object in the image and the blue rectangle shows the reduced image after cropping.

When setting the geometry of all events in the history of a drawmated picture, the drawmation must start at the beginning of the history and then treat all movements as offsets from that origin.

Figure 18a

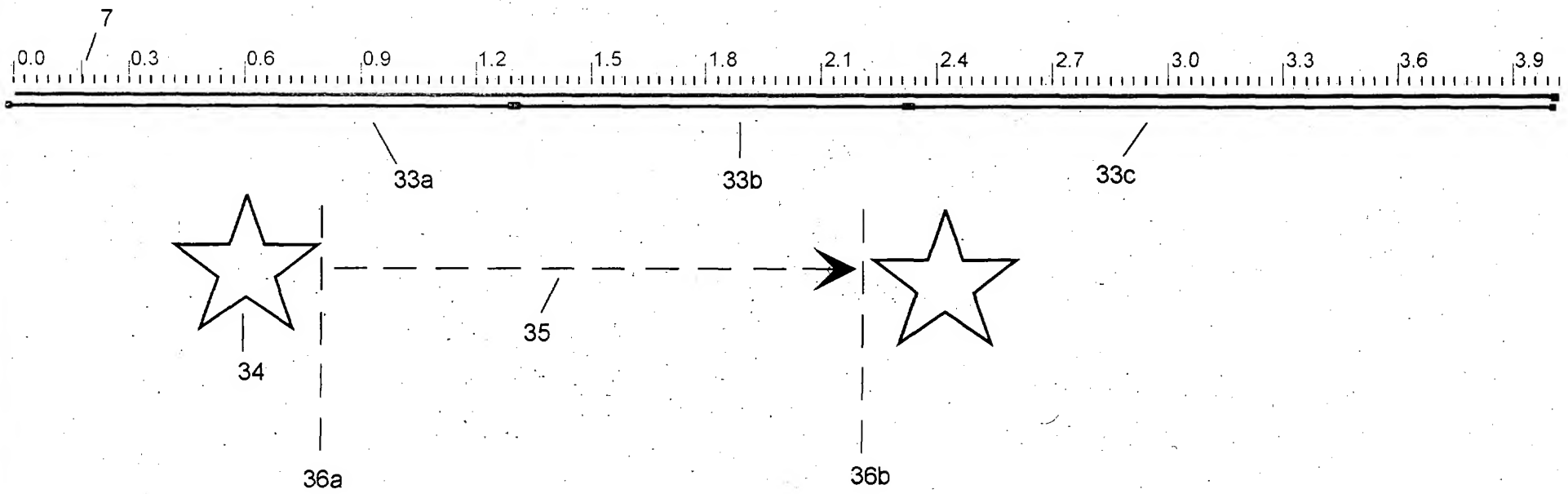


Figure 18b

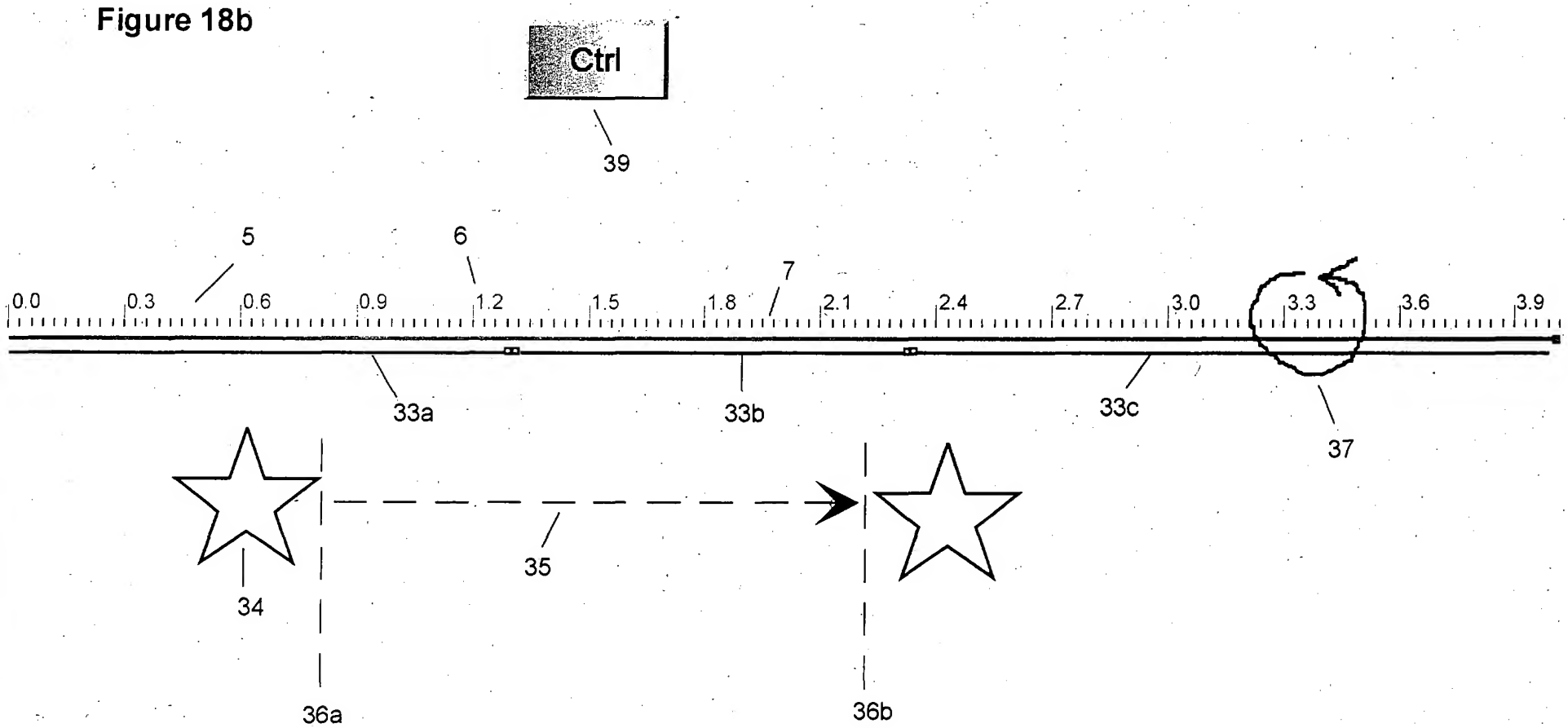

Ctrl
39
5
6
7
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
3.0
3.3
3.6
3.9
33a
33b
33c
37
34
35
36a
36b

Figure 18c

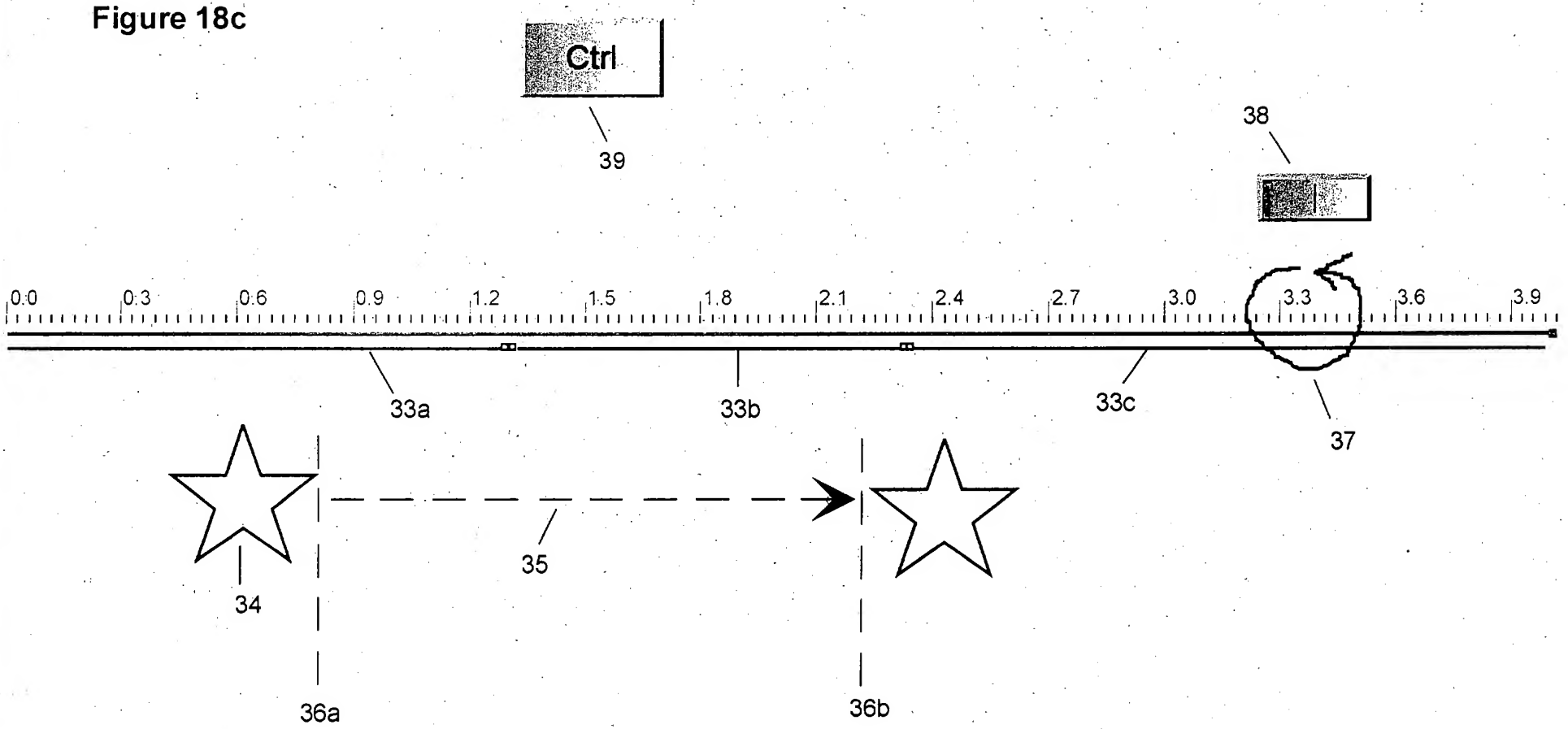
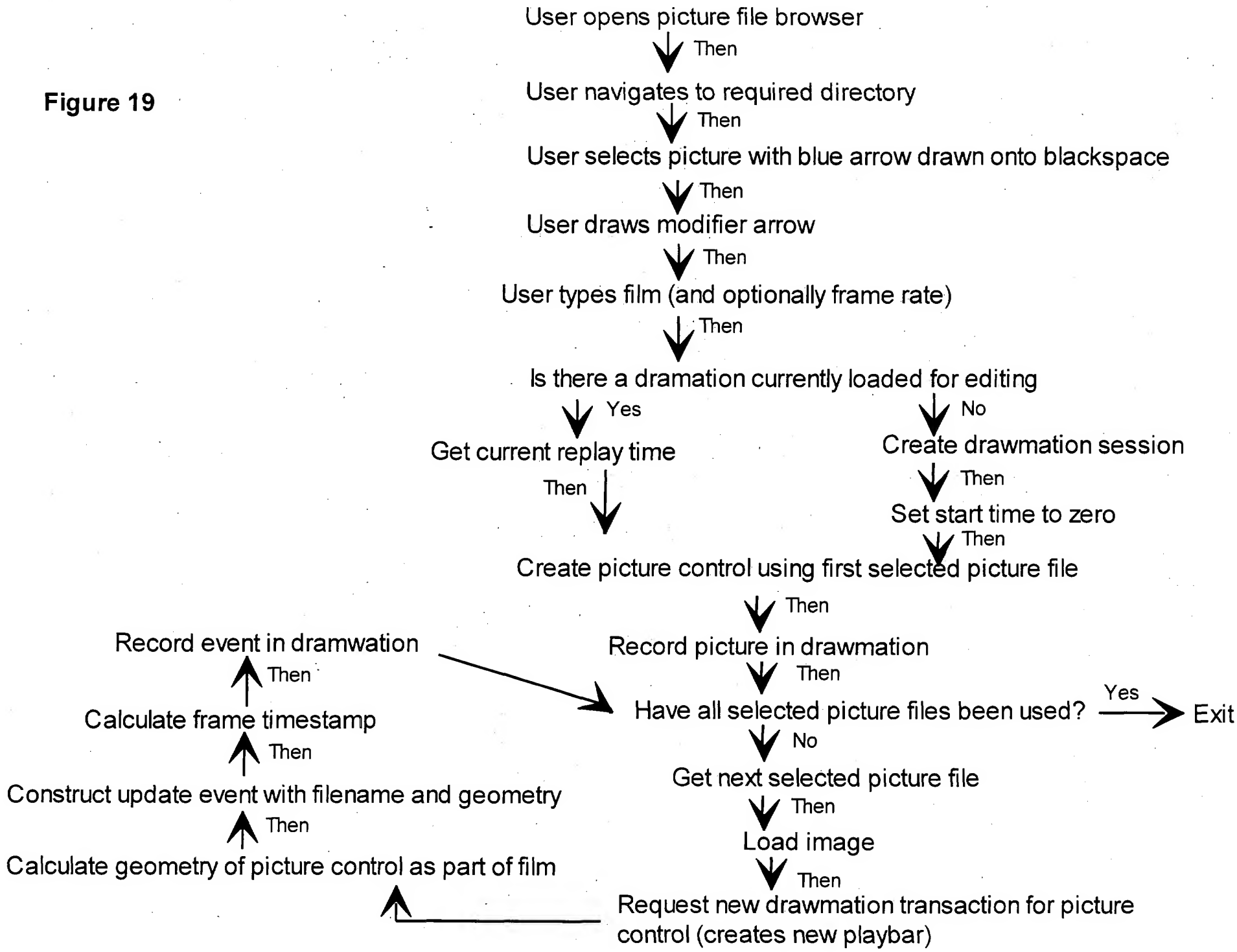

Ctrl
39
38
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
3.0
3.3
3.6
3.9
33a
33b
33c
37
34
35
36a
36b

Figure 19


User opens picture file browser
Then
User navigates to required directory
Then
User selects picture with blue arrow drawn onto blackspace
Then
User draws modifier arrow
Then
User types film (and optionally frame rate)
Then
Is there a dramation currently loaded for editing
Yes
Get current replay time
Then
No
Create drawmation session
Then
Set start time to zero
Then
Create picture control using first selected picture file
Then
Record picture in drawmation
Then
Have all selected picture files been used?
Yes
Exit
No
Get next selected picture file
Then
Load image
Then
Request new drawmation transaction for picture control (creates new playbar)
Then
Calculate geometry of picture control as part of film
Then
Construct update event with filename and geometry
Then
Calculate frame timestamp
Then
Record event in dramwation

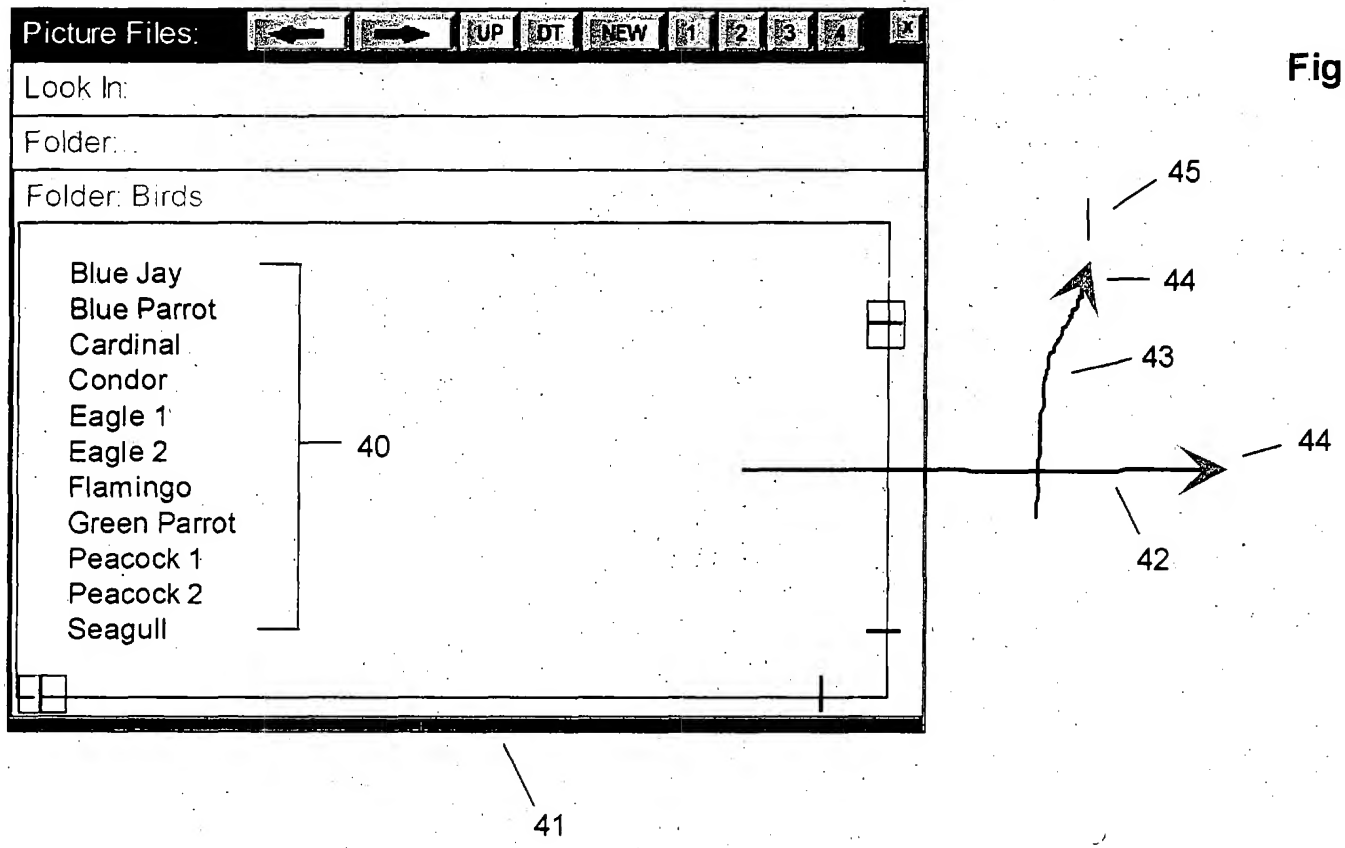
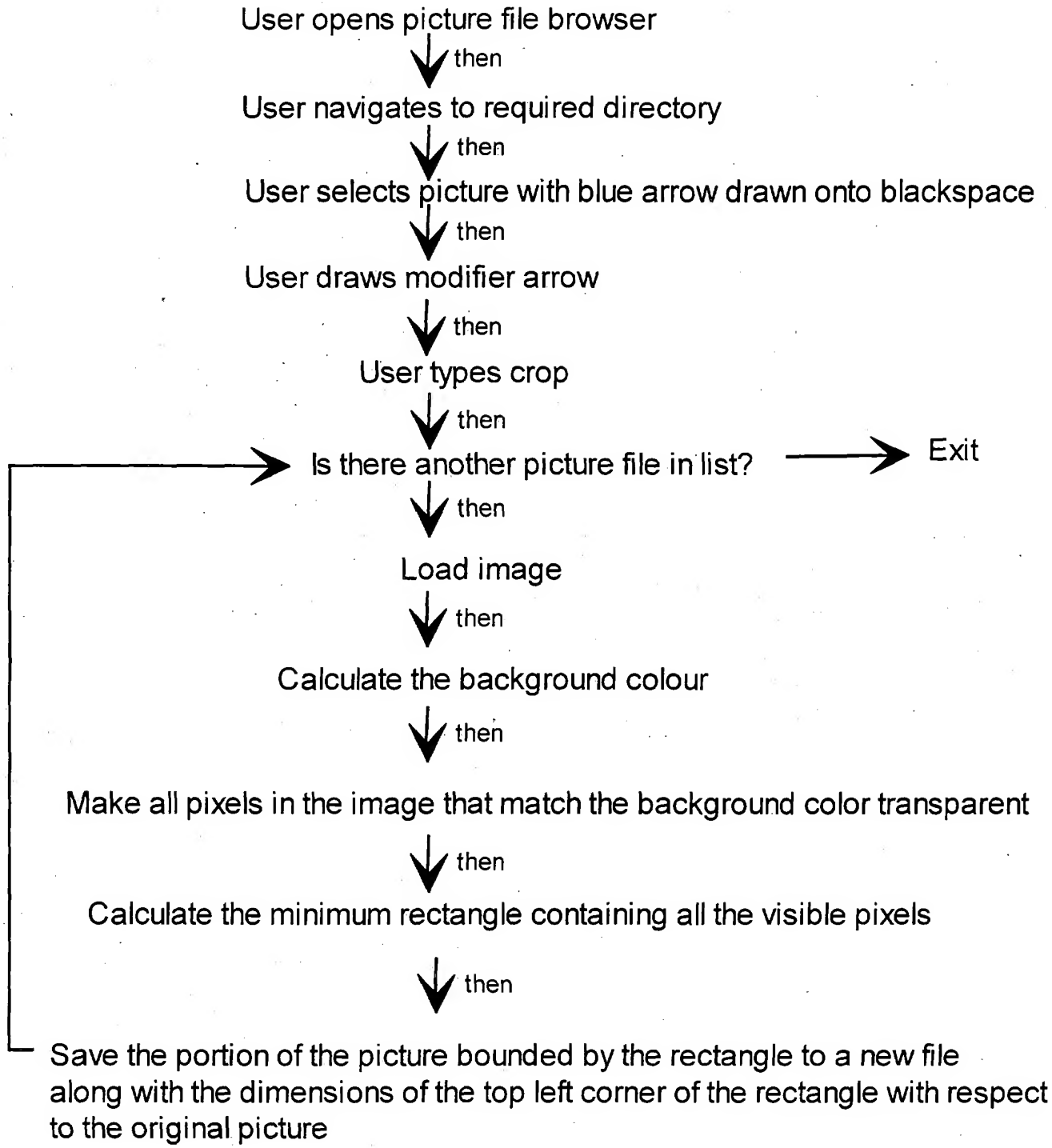

Picture Files:
UP
DT
NEW
1
2
3
4
Look In:
Folder:
Folder: Birds
Blue Jay
Blue Parrot
Cardinal
Condor
Eagle 1
Eagle 2
Flamingo
Green Parrot
Peacock 1
Peacock 2
Seagull
40
41
42
43
44
44
45

Figure 20

Figure 21


User opens picture file browser
then
User navigates to required directory
then
User selects picture with blue arrow drawn onto blackspace
then
User draws modifier arrow
then
User types crop
then
Is there another picture file in list?
Exit
then
Load image
then
Calculate the background colour
then
Make all pixels in the image that match the background color transparent
then
Calculate the minimum rectangle containing all the visible pixels
then
Save the portion of the picture bounded by the rectangle to a new file along with the dimensions of the top left corner of the rectangle with respect to the original picture

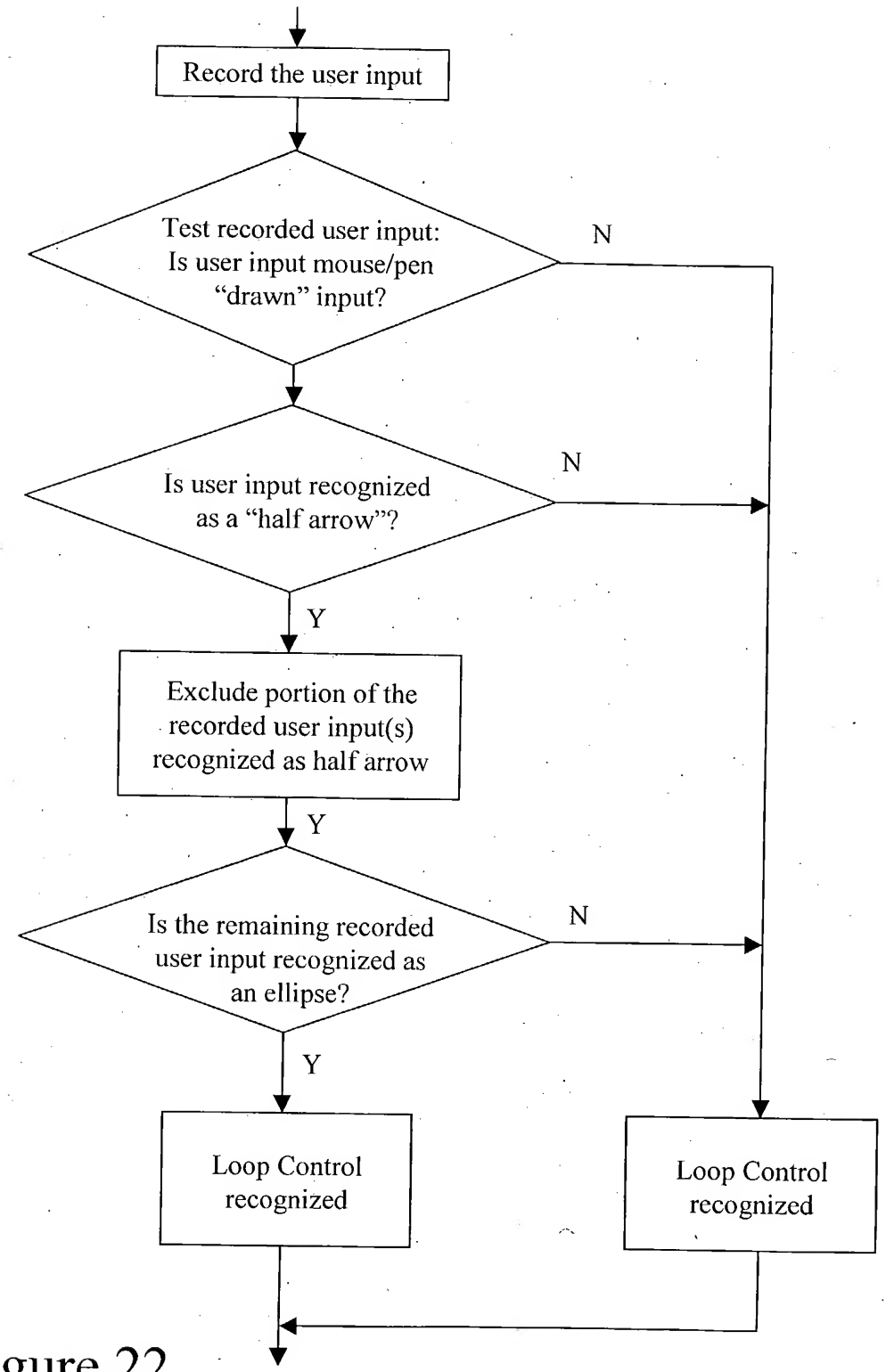

Record the user input
Test recorded user input: Is user input mouse/pen "drawn" input?
N
Is user input recognized as a "half arrow"?
N
Y
Exclude portion of the recorded user input(s) recognized as half arrow
Y
Is the remaining recorded user input recognized as an ellipse?
N
Y
Loop Control recognized
Loop Control recognized

Figure 22